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EXAMINER	
DANIELS, ANTHONY J	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/816,055	QUAN, SHUXUE	
	Examiner	Art Unit	
	ANTHONY J. DANIELS	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 September 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8,10,13-15,17,19,22-25,27,29 and 32-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8,10,13-15,17,19,22-25,27,29 and 32-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment, filed 9/25/2008, has been entered and made of record. Claims 1-6,8,10,13-15,17,19,22-25,27,29 and 32-35 are pending in the application.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is an apparatus claim yet it includes the limitation, "processing the first set of wavelengths and the second set of wavelengths to calculate a surface reflectance and a digital representation of an object". This limitation is in the form of a step for a method claim. For the purposes of art rejection, the examiner will interpret the claim limitation as "a processor for processing the first set of wavelengths and the second set of wavelengths to calculate a surface reflectance and a digital representation of an object". The examiner suggests an amendment of this sort.

Claim Objections

1. In accordance with 112 rejection above, Claim 2 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the

claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

2. Claim 14 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Response to Arguments

1. Applicant's arguments with respect to claims 1,3,4,13 and 35 and the Roddy et al. reference have been considered but are moot in view of the new ground(s) of rejection.

2. Applicant's arguments with respect to claims 1,5 and 6 and the have been considered but are moot in view of the new ground(s) of rejection.

3. Applicant's arguments regarding claims 8 and 10 and the examiner's Official Notice statement have been fully considered but they are not persuasive.

Applicant argues that the examiner's Official Notice statement cannot fill the gap between Roddy et al. and the missing element of the claims. The examiner respectfully disagrees with this assertion. The examiner submits that Roddy et al. supports providing colors other than red, blue and green to expand a color gamut, and this teaching gives way to the examiner's Official Notice statement. Utilizing those colors corresponding to a complementary color filter allows for an expanded color gamut within the context of the

Roddy et al. reference. As far as a reference supporting the Official Notice statement, the examiner submits the previously cited US Patent to Tani et al. (US # 5,379,069). Figures 2B and 3 show a complementary filter pattern (CYMgG) and a Bayer filter pattern (i.e. RGB), respectively.

Also, Noguchi teaches the use of 8 wavelengths to calculate a spectral reflectance. Although, Noguchi does not explicitly teach two separate sensors having those wavelengths, Figure 7A of Roddy et al. clearly cures such a deficiency.

4. Applicant's arguments regarding claims 2,14-17,19,25,27 and 29 and the Roddy et al. in view of Noguchi rejection have been fully considered but they are not persuasive.

Please see arguments above; particularly, those concerning the Roddy et al. and Noguchi references.

5. As to Applicants arguments concerning claims 22-24 and 32-34, the examiner believes those arguments have been addressed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-6,8,10,13-15,17,19,25,27,29 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy et al. (US # 7,057,654) in view of Noguchi (US # 6,885,394).

As to claim **1**, Roddy et al. teaches a digital imaging system (Figure 7b) comprising: a first imaging sensor (Figure 7b, area array photosensor "40"); a second imaging sensor (Figure 7b, area array photosensor "42"), the second imaging sensor coupled to the first imaging sensor (Figure 7a, two photosensors coupled by beamsplitter "36"); a first multichromatic filter coupled to the first imaging sensor (Figure 8b; Col. 6, Lines 66 and 67), wherein the first multichromatic filter transmits light at a first set of wavelengths, the first set of wavelengths corresponding to at least two imaging channels, and wherein each imaging channel transmitted through the first multichromatic filter corresponds to a different color and the first imaging sensor senses the at least two imaging channels of the first set of wavelengths (Figure 8b, R and B); and a second multichromatic filter coupled to the second imaging sensor (Figure 8a; Col. 6, Lines 63-66), wherein the second multichromatic filter transmits the light at a second set of wavelengths, the second set of wavelengths corresponding to at least two imaging channels offset from the imaging channels of the first set of wavelengths (Figure 8a, C and G), and wherein each imaging channel transmitted through the second multichromatic filter corresponds to a color different from the other transmitted imaging channels and the second imaging sensor senses the at least two imaging channels of the second set of wavelengths (Figure 8a, Figure 8b, C and G different from R and B). Although Roddy et al. does not disclose it explicitly, the examiner takes **Official Notice** that the providing color filters having RGB (3 colors) or Cy, Mg, Ye and G (4 colors) on

image sensors is well known and expected in the art. One of ordinary skill in the art would have been motivated to place either or both of these color filter arrays on either or both of the photosensors “40” and "42" in Roddy et al., because an artisan of ordinary skill in the art would recognize that would allow for an expanded color gamut, thereby providing a more pleasing image when input to a projector mechanism or a printing device (see Roddy et al., Col. 4, Lines 4-9). The claim also differs from Roddy et al. in that it further requires a processor for processing the first set of wavelengths and the second set of wavelengths to calculate a surface reflectance and a digital representation of an object.

In the same field of endeavor, Noguchi teaches an apparatus for outputting a multi-band image having an image sensor that senses at least four separate wavelengths of light (Figure 2, Col. 6, Lines 26-33). The signals representative of these wavelengths is input to a processor that is coupled to the image sensor (Figure 4, image output unit “14”). The processor utilizes digital data (Col. 7, Lines 21-25) to perform surface reflectance calculation based on either chromaticity reproduction or waveform reproduction (Col. 6, Line 54 – Col. 7, Line 11). In light of the teaching of Noguchi, it would have been obvious to one of ordinary skill in the art to include the processor of Noguchi in the system of Roddy et al. to calculate the surface reflectance of the RGBC, because an artisan of ordinary skill in the art would recognize that this would that this would allow the increase the degree of coincidence between the original image and the duplicate image by deciding the proper surface reflectance reproduction process (see Noguchi, Col. 1, Lines 41-67).

As to claim **2**, Roddy et al., as modified by Noguchi, teaches the digital imaging system of claim 1 further comprising: a processor to calculate a surface reflectance of an object based on the first set of wavelengths and the second set of wavelengths (see Noguchi, Col. 7, Lines 21-25).

As to claim **3**, Roddy et al., as modified by Noguchi, teaches the digital imaging system of claim 1, wherein the first imaging sensor is a charge coupled device (CCD) or a complementary metal-oxide semiconductor (see Roddy et al., Col. 4, Lines 24 and 25).

As to claim **4**, Roddy et al., as modified by Noguchi, teaches the digital imaging system of claim 1, wherein the second imaging sensor is a charge coupled device (CCD) or a complementary metal-oxide semiconductor (see Roddy et al., Col. 4, Lines 24 and 25).

As to claim **5**, Roddy et al., as modified by Noguchi, teaches the digital imaging system of claim 1, wherein the first multichromatic filter is a trichromatic filter (see Official Notice statement above, RGB).

As to claim **6**, Roddy et al., as modified by Noguchi, teaches the digital imaging system of claim 1, wherein the second multichromatic filter is a trichromatic filter (see Official Notice statement above, Mg, G and Ye).

As to claims **8** and **10**, see Official Notice statement above.

As to claim **13**, Roddy et al. teaches a digital imaging apparatus (Figure 7a) comprising: a first means for capturing colorimetric information (Figure 7a, area array photosensor "40"); a second means for capturing colorimetric information (Figure 7a, area array photosensor "42"), the first means for capturing colorimetric information coupled to the second means for capturing colorimetric information (Figure 7a, two

photosensors coupled by beamsplitter "36"); a first means for multichromatic filtering coupled with the first means for capturing colorimetric information (Figure 8b; Col. 6, Lines 66 and 67), wherein the first means for multichromatic filtering to transmit light at a first set of wavelengths and the first set of wavelengths corresponds to at least two imaging channels, and wherein each imaging channel transmitted through the first means for multichromatic filtering corresponds to a different color and the first means for capturing colorimetric information senses the at least two imaging channels of the first set of wavelengths (Figure 8b, R and B); and a second means for multichromatic filtering coupled with the second means for capturing colorimetric information (Figure 8a; Col. 6, Lines 63-66), wherein the second means for multichromatic filtering to transmit the light at a second set of wavelengths, the second set of wavelengths corresponds to at least two imaging channels offset from the imaging channels of the first set of wavelengths (Figure 8a, C and G), and wherein each imaging channel transmitted through the second means for multichromatic filtering corresponds to a color different from the other transmitted imaging channels and the second means for capturing colorimetric information senses the at least two imaging channels of the second set of wavelengths (Figure 8a, Figure 8b, C and G different from R and B). Although Roddy et al. does not disclose it explicitly, the examiner takes **Official Notice** that the providing color filters having RGB (3 colors) or Cy, Mg, Ye and G (4 colors) on image sensors is well known and expected in the art. One of ordinary skill in the art would have been motivated to place either or both of these color filter arrays on either or both of the photosensors "40" and "42" in Roddy et al., because an artisan of ordinary skill in the art would recognize that would allow for an expanded color gamut, thereby providing a more pleasing image when input to a

projector mechanism or a printing device (see Roddy et al., Col. 4, Lines 4-9). The claim also differs from Roddy et al. in that it further requires a means for processing to calculate a surface reflectance and a digital representation of an object based on the first set of wavelengths and the second set of wavelengths, the means for processing coupled with the first means for capturing colorimetric information and the second means for capturing colorimetric information.

In the same field of endeavor, Noguchi teaches an apparatus for outputting a multi-band image having an image sensor that senses at least four separate wavelengths of light (Figure 2, Col. 6, Lines 26-33). The signals representative of these wavelengths is input to a processor that is coupled to the image sensor (Figure 4, image output unit "14"). The processor utilizes digital data (Col. 7, Lines 21-25) to perform surface reflectance calculation based on either chromaticity reproduction or waveform reproduction (Col. 6, Line 54 – Col. 7, Line 11). In light of the teaching of Noguchi, it would have been obvious to one of ordinary skill in the art to include the processor of Noguchi in the system of Roddy et al. to calculate the surface reflectance of the RGBC, because an artisan of ordinary skill in the art would recognize that this would that this would allow the increase the degree of coincidence between the original image and the duplicate image by deciding the proper surface reflectance reproduction process (see Noguchi, Col. 1, Lines 41-67).

As to claim **14**, Roddy et al., as modified by Noguchi, teaches the digital imaging apparatus of claim 13 further comprising: a means for processing to calculate a surface reflectance of an object based on the first set of wavelengths and the second set of wavelengths (see Noguchi, Col. 7, Lines 21-24), the means for processing coupled with

the first means for capturing colorimetric information and the second means for capturing colorimetric information (see Noguchi, Figure 2).

As to claim **15**, Roddy et al. teaches a method comprising: receiving a first set of wavelengths of light at a first sensor via a first multichromatic filter, the first set of wavelengths corresponding to at least two imaging channels and wherein each imaging channel transmitted through the first multichromatic filter corresponds to a different color and; receiving a second set of wavelengths of the light at a second sensor via a second multichromatic filter, the second set of wavelengths corresponding to at least two imaging channels offset from the imaging channels of the first set of wavelengths and wherein each imaging channel transmitted through the second multichromatic filter corresponds to a color different from the other transmitted imaging channels (For all features, see Figures 7a, 8a, 8b and column 6, lines 61-67 of Roddy et al.). Although it is not stated explicitly in Roddy et al., the examiner takes **Official Notice** that providing a digital control unit operating on instructions from a machine-readable medium is well known and expected in the art. One of ordinary skill would have been motivated to include such a control unit in the system of Roddy et al., because this would allow for quick, cost effective operation of imaging. Also, Although Roddy et al. does not disclose it explicitly, the examiner takes **Official Notice** that the providing color filters having RGB (3 colors) or Cy, Mg, Ye and G (4 colors) on image sensors is well known and expected in the art. One of ordinary skill in the art would have been motivated to place either or both of these color filter arrays on either or both of the photosensors “40” and "42" in Roddy et al., because an artisan of ordinary skill in the art would recognize that would allow for an expanded color gamut, thereby providing a more pleasing image

when input to a projector mechanism or a printing device (see Roddy et al., Col. 4, Lines 4-9). The claim differs from Roddy et al. in that it further requires the step of processing the first set of wavelengths and the second set of wavelengths to calculate a surface reflectance and a digital representation of an object.

In the same field of endeavor, Noguchi teaches an apparatus for outputting a multi-band image having an image sensor that senses at least four separate wavelengths of light (Figure 2, Col. 6, Lines 26-33). The signals representative of these wavelengths is input to a processor that is coupled to the image sensor (Figure 4, image output unit "14"). The processor utilizes digital data (Col. 7, Lines 21-25) to perform surface reflectance calculation based on either chromaticity reproduction or waveform reproduction (Col. 6, Line 54 – Col. 7, Line 11). In light of the teaching of Noguchi, it would have been obvious to one of ordinary skill in the art to include the processor of Noguchi in the system of Roddy et al. to calculate the surface reflectance of the RGBC, because an artisan of ordinary skill in the art would recognize that this would that this would allow the increase the degree of coincidence between the original image and the duplicate image by deciding the proper surface reflectance reproduction process (see Noguchi, Col. 1, Lines 41-67).

As to claims **17** and **19**, see Official Notice statement above

As to claims **25**,**27** and **29**, claims 25,27 and 29 are method claims corresponding to the apparatus claims 15,17 and 19, respectively. Therefore, claims 25,27 and 29 are analyzed and rejected as previously discussed with respect to claims 15,17 and 19, respectively.

As to claim **35**, Roddy et al., as modified by Noguchi, teaches the digital imaging system of claim 1. The claim differs from Roddy et al., as modified by Noguchi, in that it further requires that the first set of wavelengths includes one imaging channel each corresponding to colors red, blue and green and the second set of wavelengths includes one imaging channel corresponding to a color that is less than blue wavelengths, one imaging channel corresponding to a color that is between green and blue wavelengths, one imaging channel corresponding to a color that is in between red and green wavelengths, and one imaging channel corresponding to a color that is above red wavelengths.

In the same field of endeavor, Noguchi teaches an apparatus utilizing two sets of wavelengths to calculate a surface reflectance (Col. 7, Lines 21-24). The first set includes wavelengths corresponding to the red, blue and green wavelengths (Figure 3, wavelengths 8 (red), 3 (blue) and 4 (green)). The second set includes one imaging channel corresponding to a color that is less than blue wavelengths (Figure 3, wavelength 1), one imaging channel corresponding to a color that is between green and blue wavelengths (Figure 3, wavelength 2), one imaging channel corresponding to a color that is in between red and green wavelengths (Figure 3, wavelength 5), and one imaging channel corresponding to a color that is above red wavelengths (Figure 3, wavelength 7 is higher than wavelength 8 (red) on the frequency scale). In light of the teaching of Noguchi, it would have been obvious to include these bands on the first and second sensors of Roddy et al., because this would allow for an expanded color gamut, thereby providing a more pleasing image when input to a projector mechanism or a printing device (see Roddy et al., Col. 4, Lines 4-9).

3. Claims 22,24,32 and 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy et al. (US # 7,057,654) in view of Noguchi (US # 6,885,394) and further in view of Vilaseca et al. (see attached NPL).

As to claims **22** and **24**, Roddy et al., as modified by Noguchi, teaches the machine-readable medium of claim 15. The claims differ from Roddy et al., as modified by Noguchi, in that they further require that the calculation of the surface reflectance include performing principal component analysis and Wiener estimation.

In the same field of endeavor, Vilaseca teaches an estimation of spectral reflectance wherein Wiener inverse estimation and principal component analysis is used to calculate spectral reflectance (p. 1789, 2nd paragraph). In light of the teaching of Vilaseca, it would have been obvious to include these estimation algorithms in the calculation of spectral reflectance in the system of Noguchi, because an artisan of ordinary skill in the art would recognize that this would allow for an efficient way to achieve reproduced color.

As to claims **32** and **34**, claims 32 and 34 are method claims corresponding to the apparatus claims 22 and 24, respectively. Therefore, claims 32 and 34 are analyzed and rejected as previously discussed with respect to claims 22 and 24, respectively.

4. Claims 23 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy et al. (US # 7,057,654) in view of Noguchi (US # 6,885,394) and further in view of Arai (US # 5,864,834).

As to claim **23**, Roddy et al., as modified by Noguchi, teaches the machine-readable medium of claim 15. The claim differs from Roddy et al., as modified by Noguchi, in that it further requires that the calculation of the surface reflectance include performing independent component analysis.

In the same field of endeavor, Arai teaches the use of independent analysis of illuminants to achieve spectral reflectance (Col. 2, Line 7-15). In light of the teaching of Arai, it would have been obvious to one of ordinary skill in the art to include this algorithm in the calculation of spectral reflectance in the system of Noguchi, because one of ordinary skill in the art would recognize that this would ensure that the reproduced color matches the color of the original image (see Arai, Col. 2, Lines 7-15).

As to claim **33**, claim 33 is a method claim corresponding to the apparatus claim 23. Therefore, claim 33 is analyzed and rejected as previously discussed with respect to claim 23.

Conclusion

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the

advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. DANIELS whose telephone number is (571)272-7362. The examiner can normally be reached on 8:00 A.M. - 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on (571) 272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AD
12/17/2008

/Sinh N Tran/
Supervisory Patent Examiner, Art Unit 2622